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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/392,899	09/09/1999	RONALD B AZCARATE	TI-22451	1981

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EXAMINER

CHAMBLISS, ALONZO

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 12/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/392,899

Applicant(s)

AZCARATE ET AL.

Examiner

Alonzo Chambliss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 01 October 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. The objections to the oath or declaration in the non-final rejection filed on 6/20/02 in Paper No. 9 has been withdrawn.
2. The provisional application information on the Utility patent application transmittal was not entered into the specification. However, the appropriate steps have been made to add this information into the specification.

### ***Response to Arguments***

3. Applicant's arguments filed 10/1/02 in Paper No. 10 have been fully considered but they are not persuasive.

Applicant alleges Ohno fail to disclose a semiconductor die mounted on the heat slug, wherein bond pads on the semiconductor die is attached to the lead frame leads with bond wires. This argument is respectfully deemed to be unpersuasive because Ohno teaches a semiconductor die 34 mounted on the heat slug 14, 40, wherein the bond pads on the semiconductor die 34 are attached to the lead frame leads 12, 28 with bond wires 36 and arranged along all four edges of the die 34 (see col. 5 lines 28-32).

Applicant alleges that there is no motivation to combine Ohno with Ootsuki since Ohno discloses a TAB core section and Ootsuki discloses a traditional lead frame. This argument is respect fully deemed to be unpersuasive because since both Ohno and Ootsuki disclose attaching a lead frame to a heat slug using a tape. Furthermore, one skilled in the art would readily recognize that one can use a small piece of tape or a

tape completely covering the lead when attached to the heat sink, since incorporating more tape to the lead frame will more firmly secure the inner leads to the heat slug.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, and 7, insofar as definite, are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Ohno et al. (U.S. 5,227,662).

With respect to Claims 1 and 7, Ohno teaches a strapless lead frame/heat slug combination (i.e. heat/heat slug without a tie bar or tie strap connected to die pad) as illustrated in Figs. 1A, 1E, and 3D. A heat slug (i.e. heat sink, heat spreader, or heat radiating element) 14, 40 is attached to a lead frame 10. Lead frame leads 12, 28 are all being evenly distributed around a semiconductor die mount area and the inner ends of the leads 12, 28 overlap the heat slug 14, 40 (see col. 5 lines 12-19 and 38-48; Figs. 1A, 1E, and 3D). The die mount area is the area of the heat slug where the die 34 is attached to the heat slug. A heat slug (i.e. heat sink, heat spreader, or heat radiating element) 14, 40 is providing on the die mount area, wherein the heat slug (i.e. heat sink, heat spreader, or heat radiating element) 14, 40 is attached under the lead frame 10 with tape 16 (see col. 5 lines 12-19; Figs. 2, and 5-7). The semiconductor die 34 mounted on the heat slug 14, 40, wherein the bond pads on the semiconductor die 34

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are attached to the lead frame leads 12, 28 with bond wires 36 and arranged along all four edges of the die 34 (see col. 5 lines 28-32). Giving the teachings of the above product, claim 1 is clearly anticipated by Ohno.

With respect to Claim 2, the semiconductor die 34 has four sides and corners, and the lead frame leads 12 are all evenly distributed on each of the four sides and around the corners (see Figs. 1E, 3D, and 5). Giving the teachings of the above product, claim 2 is clearly anticipated by Ohno.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3-6, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohno et al. (U.S. 5,227,662) as applied to claims 1 and 7 above, and further in view of Ootsuki et al. (U.S. 5,652,461).

With respect to Claims 3 and 8, Ohno fails to disclose two things:

(1) A lead frame having four sides and two of the four sides having a different number of leads from two other sides.

(2) A semiconductor die having a different number of bond pads on adjacent sides, wherein at least one of the bond pads is attached by a bond wire to a lead frame lead on a side of the lead frame adjacent to the side of the semiconductor die on which the bond pad is located. However, Ootsuki discloses a lead frame having four sides and two of the four sides having a different number of leads from two other sides (see Figs. 2B, 5, and 16A). Also, Ootsuki discloses that the lead frame can have different number of leads from two other sides (as seen in Figs. 2B, 5, and 16A) and all of the leads of the lead frame having the same number of leads on all four sides (as illustrated in Figs. 9B, 10B, 11B, and 12B). Thus, the number of leads for each side of the lead frame can change based on the desired arrangement required for bonding the leads to the semiconductor device. Therefore, it would have been obvious to one skilled in the art to incorporate the leads of the lead frame having two sides with different number of leads from the other two sides with the device of Ohno, since number of leads for each side of the lead frame can change based on the desired arrangement required for bonding the leads to the semiconductor device as taught by Ootsuki.

With respect to Claim 4, Ootsuki discloses a semiconductor die 3 having a different number of bond pads on adjacent sides (i.e. the side perpendicular to the next side of the die), wherein at least one of the bond pads is attached to a bond wire 5 that is attached to lead frame leads 1 on a side of the lead frame adjacent (i.e. the side of the lead frame that is perpendicular to the adjacent side of the semiconductor die 3) on which the bond pad is located (see Figs. 2B, 5, and 16A).

With respect to Claim 5, Ohno discloses a strapless lead frame/heat slug combination (i.e. heat/heat slug without a tie bar or tie strap connected to die pad) (as seen in Figs. 1A, 1E, and 3D). A heat slug (i.e. heat sink, heat spreader, or heat radiating element) 14, 40 is attached to a lead frame 10. Lead frame leads 12, 28 are all being evenly distributed around a semiconductor die mount area (see col. 5 lines 12-19 and 38-48; Figs. 1A, 1E, and 3D). The die mount area is the area on the heat slug that the die 34 is attached to the heat slug. A heat slug (i.e. heat sink, heat spreader, heat radiating element) 14, 40 is providing the die mount area, wherein the heat slug (i.e. heat sink, heat spreader, heat radiating element) 14, 40 is attached under the lead frame 10 with tape 16 (see col. 5 lines 12-19; Figs. 2, and 5-7). The semiconductor die 34 mounted on the heat slug 14, 40, wherein the bond pads on the semiconductor die 34 are attached to the lead frame leads 12, 28 with bond wires 36 (see col. 5 lines 28-32). Ootsuki discloses the same number of lead frame leads 1 on opposites sides of the lead frame and a different number of lead frame leads 1 on adjacent sides of the lead frame (see Figs. 2B, 5, and 16A). Also, Ootsuki discloses that the lead frame has a different number of leads from two other sides (i.e. the same number of lead frame

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leads on opposites sides of the lead frame and different number of lead frame leads on adjacent sides of the lead frame) as seen in Figs. 2B, 5, and 16A and all of the leads of the lead frame having the same number of leads on all four sides (as illustrated in Figs. 9B, 10B, 11B, and 12B). Thus, the number leads for each side of the lead frame changes based on the desired arrangement required for bonding the leads to the semiconductor device. Therefore, it would have been obvious to one skilled in the art to incorporate the leads of the lead frame having two sides with different number of leads from the other two sides with Ohno, since the number of leads for each side of the lead frame can change based on the desired arrangement required for bonding the leads to the semiconductor device as taught by Ootsuki.

With respect to Claim 6, Ootsuki discloses a semiconductor die 3 having a different number of bond pads on adjacent sides (i.e. the side perpendicular to the next side of the die), wherein at least one of the bond pads is attached to a bond wire 5 that is attached to lead frame leads 1 on a side of the lead frame adjacent (i.e. the side of the lead frame that is perpendicular to the adjacent side of the semiconductor die 3) on which the bond pad is located (see Figs. 2B, 5, and 16A).

The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.

Applicant is not being supplied a copy of U.S. Patent No. 5,652,461, since it was made of record and cited in the prior rejection.

### ***Conclusion***



8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

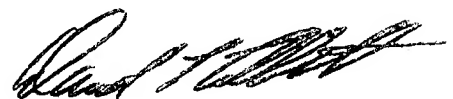
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956.

AC

AC/December 21, 2002



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